Convolutional Neural Networks for Satellite Image Segmentation

Ganiyu Ibraheem, Philipp Seybold, James Purcell, Ahmed Abouseida and Evgeny Saveliev.

Electronics and Computer Science
University of Southampton
April 22, 2018

Abstract

This report highlights how a convolutional neural network was used for segmenting objects in satellite images. This project is inspired by the Kaggle DSTL satellite imagery feature detection challenge where the requirement was to build a learning machine that identify features in overhead imagery to alleviate the burdens on their image analysts.

Our solution is based on U-Net, a convolutionary neural network which we trained with satellite images of 19-spectral bands and achieved a 90% classification accuracy.

1 Introduction

1.1 Related Work

2 Satellite Imagery Dataset

2.1 Image Annotation

2.2 Imagery statistics

- Segmentation Quality:
- Object Naming:

3 U-Net Convolution Network

4 Experiments

4.1 Metrics

- Pixel Accuracy: indicates the proportion of correctly classified pixels
- Mean Accuracy: indicates the proportion of correctly classified pixels averaged over all the classes.
- Mean IoU: indicates the intersection-over-union between the predicted and ground-truth pixels, averaged over all the classes.
- Weighted IoU: indicates the IoU weighted by the total pixel ratio of each class.

5 Conclusion

6 Future Work

This material is important – part of the value of a paper is showing how the work sets new research directions. I like bullet lists here. A couple of things to keep in mind:

- We are currently extending the algorithm to use Mask-RCNN and PSPNet, and preliminary results are encouraging.
- We are exploring hand crafting a more extensive dataset using Google Earth; Gathering images at different intervals of heights above sea level e.g 200m, 500m, 1km etc and utilising a site like Amazon Turk or Appen

References

[1] C. Brooks, E. A. Lee, X. Liu, S. Neuendorffer, Y. Zhao, and H. Zheng. Heterogeneous concurrent modeling and design in java. Technical Report Technical Memorandum UCB/ERL M04/27, University of California, July 29 2004.